Presentation by Rowan Schwynn

30 November 2020

Methodology

This assessment reviewed the relative performance of the options in improving:

- Bus travel time and reliability
- Convenience and comfort of people waiting for, boarding and alighting buses

The assessment first identified empirical measures that could be used to test and quantify each options relative performance against the criteria:

Assessment Criteria	Considerations	Metrics
Bus travel time and reliability	• Bus Journey Time – by corridor or link • Reliability	• Travel Time (mean, max, min and spread) • Standard Deviation of JT
The convenience and comfort of people waiting for, boarding and alighting buses	• Walking distances to stops • Bus service rates • Customer wait times • Bus stop crowding	• Catchment areas • Buses per hour per stop • Passenger wait time (mean, max, min and spread • Number of waiting passengers and area occupied.

Methodology

In order to adequately assess the criteria, two models were created:

Model	Summary	Notes
Journey Time Model – MRCagney	Assessed the physical journey of buses including delay points such as intersections, ped signals etc. along the corridor and links	• Excluded congestion delay from mixed traffic operations. • Excluded bus on bus delay • Assessed AM and PM • Assessed North and South movements.
Bus Stop Model	Assessed the arrival and departure rate of buses at each stop, passenger wait times and passenger volumes	Included factors for traffic congestion, mixed fleet of buses and variable dwell times per passengers. Model was uncoordinated – stops were assessed in isolation and did not factor in passenger route choice or arrival rates.

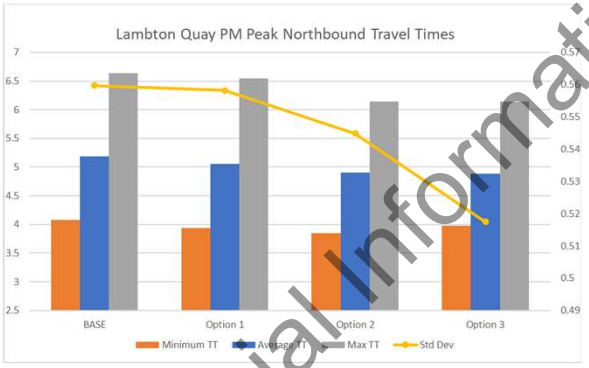
Both models applied a distribution of probabilities to reflect the variability of operations along the GM.
This was use to emulate:

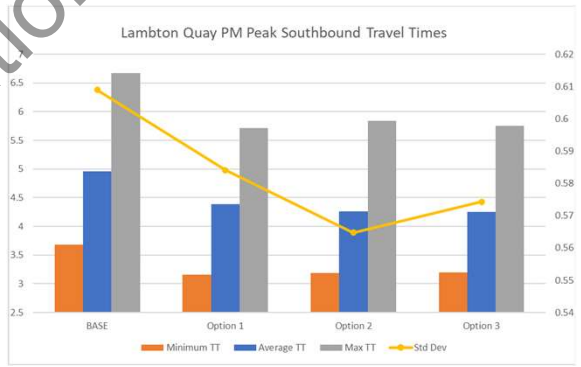
- Intersection and signal delays (both models)
- Bus fleet composition (bus service model)
- Traffic congestion (bus service model)
- Variable passenger dwell time (bus service model)

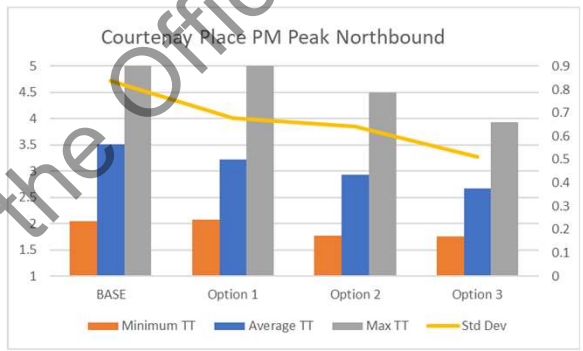
Results – Journey Time Model

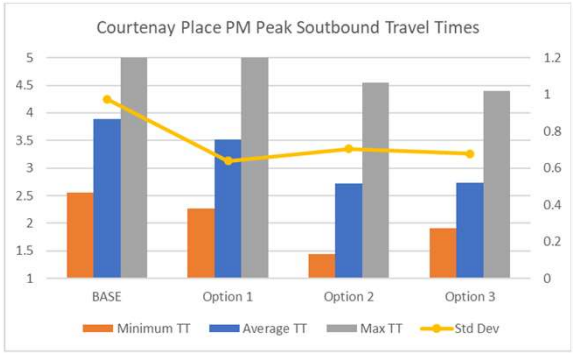
Summary Findings:

- All options (1,2 & 3) provide reduced travel times comparative to the base case
- Generally, options 2 and 3 have faster journey times across all time periods and directions of travel
- Reliability also improves under all options, with options 2 and 3 typically providing less variability in travel time.
- In most cases, there is marginal differences to journey time between options 2 & 3.









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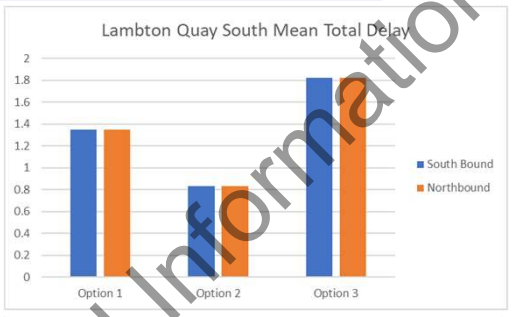
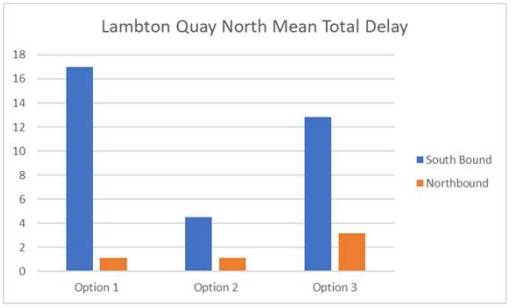
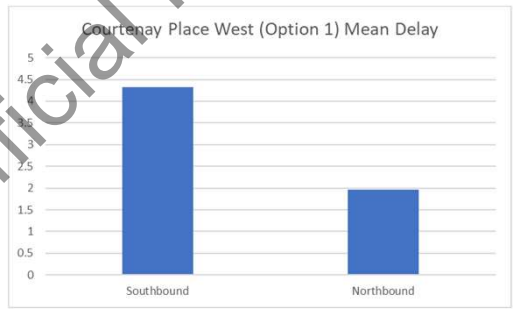
Results – Quantitative Stop Analysis

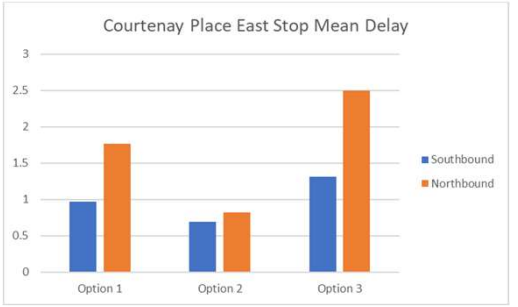
Summary Findings:

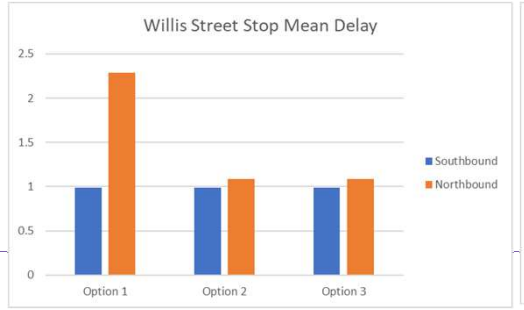
- Option 2 provides the least delay and highest throughput of buses at Lambton Quay and Courtenay Place.
- Option 3 performs the worst at Lambton Quay and Courtenay Place.
- Retention of general traffic (Northbound) on Willis reduces performance of stop under option 1.
- Courtenay Place West (Option 1 only) performs comparatively poorly
- Manners Street stops (at Cuba) remains the key constraint for all options.
- Service rates were sufficient to clear all forecast passenger volumes (no evidence of overcrowding)











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Results – Quantitative Stop Analysis

- Signal controls (intersection or pedestrian crossings) are a key controlling mechanism for bus stop function
- Accommodating general traffic in phasing results in significant reduction in service rates
- The operation and service rates of buses at bus stops along the Golden Mile may be moderated through the tactical use of signal controls and phasing
- Double decker buses are a key determinate of bus stop operation – increasing the proportion of DD's will significantly degrade the operational profile.

Results – Qualitative Stop Analysis

- Stop size and multi-flag boarding were identified as key considerations to improve stop performance, especially for the northern and southern-most stops.
- Willis Street Stops (Southbound) should be moved closer to Lambton Quay (Ideally utilising Mercer St to provide additional space for stop infrastructure).
- Removal of Courtenay West stop pair is considered viable.
- Tactical use of side road closures presents opportunities to significantly improve infrastructure and performance of bus stops.

Results – Evaluation Outcomes

	Lambton Quay				Willis Street			
	Base	Option 1	Option 2	Option 3	Base	Option 1	Option 2	Option 3
IO – Bus Travel Time and Reliability	0	1	1.5 (2)	0.5 (1)	0	1	1.5 (2)	1.5 (2)
IO – Bus Passenger Boarding and Alighting	0	0.5 (1)	2.5 (3)	1.25 (1)	0	0.5 (1)	1	1.75 (2)

Results – Evaluation Outcomes

	Manners Street		Courtenay Place			
	Base	All Options	Base	Option 1	Option 2	Option 3
IO – Bus Travel Time and Reliability	0	1	0	1	2	2
IO – Bus Passenger Boarding and Alighting	0	1	0	1.75 (2)	2.5 (3)	2.25 (2)

Results – Commentary

- Loading access to Lambton Quay, Willis and Courtenay may slightly impact bus improvements, depending on the specific configuration of bays and restrictions placed on these bays.
- Loading bays immediately adjacent to bus stops – Willis Street in particular – are a concern due to the impediment to bus access at key points.
- Indenting bus bays may mitigate some of the negative features evident in option 3, however additional space for longer bus bays is still required at the northern and southern extents of the GM.
- Taxi's are generally considered a bigger impediment to bus operations then loading, due to poor conformity to regulations and tendency to stop anywhere.
- Taxi access is non-viable in option 3.
- If Tory Street was opened to through movements only – it is expected this will have a marginal impact to bus travel times and operations.

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